

Notice of Allowability

Application No.

09/890,668

Examiner

Michelle R. Connelly-Cushwa

Applicant(s)

DA SILVA MARQUES ET AL.

Art Unit

2874

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☐ This communication is responsive to _____.
2. ☒ The allowed claim(s) is/are 1-10, 12-14, 16-23, 25, 27, 29-40, 53, 62-71, 73, 75, 76 and 79.
3. ☒ The drawings filed on 15 January 2002 are accepted by the Examiner.
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
- * Certified copies not received: _____.
5. ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
 - (a) ☐ The translation of the foreign language provisional application has been received.
6. ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application. **THIS THREE-MONTH PERIOD IS NOT EXTENDABLE**

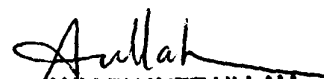
7. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
8. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No. _____.
 - (b) ☐ including changes required by the proposed drawing correction filed _____, which has been approved by the Examiner.
 - (c) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No. _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the margin according to 37 CFR 1.121(d).

9. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|---|---|
| 1 <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 5 <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 2 <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6 <input type="checkbox"/> Interview Summary (PTO-413), Paper No. _____. |
| 3 <input checked="" type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No. <u>1/15/02 & 2/3/03</u> | 7 <input type="checkbox"/> Examiner's Amendment/Comment |
| 4 <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8 <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9 <input type="checkbox"/> Other |


AKM ENAYET ULLAH
PRIMARY EXAMINER

DETAILED ACTION

Information Disclosure Statement

The prior art documents submitted by applicant in the Information Disclosure Statement filed on January 15, 2002 and February 3, 2003 have all been considered and made of record (note the attached copies of form PTO-1449).

Drawings

Three (3) sheets of formal drawings were filed on January 15, 2002 and have been accepted by the Examiner.

Specification

Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Allowable Subject Matter

Claims 1-10, 12-14, 16-23, 25, 27, 29-40, 53, 62-71, 73, 75, 76 and 79 are allowed.

The following is an examiner's statement of reasons for allowance: The prior art cited on attached form PTO-892 is the most relevant prior art known, however, the invention of claims 1-10, 12-14, 16-23, 25, 27, 29-40, 53, 62-71, 73, 75, 76 and 79 distinguishes over the prior art of record for the following reasons.

Regarding claims 1-10, 12-14, 16-23, 25, 27 and 29; the claims are allowable over the prior art of record because none of the references either alone or in combination disclose or render obvious a waveguide as defined in claim 1, comprising a doped lower cladding layer, and a doped upper cladding layer, wherein the waveguide

core includes mobile dopant ions which have diffused from the deposited doped material of the waveguide core into the upper cladding layer and the lower cladding layer to form an ion diffusion region around the waveguide core such that the waveguide core boundary walls are substantially smooth in combination with the other limitations of claim 1. Claims 2-10, 12-14, 16-23, 25, 27 and 29 depend from claim 1.

Regarding claims 30-40, 53, 62-71, 73, 75, 76 and 79; the claims are allowable over the prior art of record because none of the references either alone or in combination disclose or render obvious a method of fabricating a waveguide as defined in claim 30, comprising forming a doped lower cladding layer, forming a doped upper cladding layer, and causing mobile ion dopants included in the deposited doped core layer to undergo diffusion from the waveguide core into the surrounding upper cladding layer and lower cladding layer to form an ion diffusion region around the waveguide core such that the waveguide cores boundary walls are substantially smooth in combination with the other limitations of claim 30. Claims 31-40, 53, 62-71, 73, 75, 76 and 79 depend from claim 30.

Kersten et al. (US 4,756,734) discloses a method of making planar lightwave guides in Figure 1, the method comprising providing a substrate (2); forming a first layer (3) with a doping medium contained therein on the substrate (2); providing a masking layer (4) that functions as a diffusion barrier, the masking layer (4) having openings through which heat is applied to core zones (3b) of the first layer (3) to cause the dopant to diffuse out of the core zones (3b) into the first layer (3); and applying a further layer (5) after forming the core zones (3b). Kersten et al. does not disclose or suggest having

a dopant diffused from a core region into an upper doped cladding layer as required by independent claims 1 and 30 of the present application.

Kersten et al. (US 4,765,819) discloses a method of making a planar lightwave guide comprising providing a substrate (2); forming a first sheathing layer (6) on the substrate; forming a core layer (5) on the first sheathing layer (6), the core layer including a doping substance; forming a second sheathing layer (3) on the core layer (5); etching the sheathing and core layers to define waveguides (1), out diffusing the dopant laterally from the core (5) to create the refractive index profile shown in Figure 2 in the core (5), and forming a layer of low refractive index material (7) on the waveguides. Kersten et al. does not teach or suggest that the doping material is diffused into the sheathing layers (3, 6) or the lower refractive index layer (7).

Valette (US 4,929,302) discloses a process for the production of light microguides, wherein the microguides include doped core layers, however, Valette does not teach or suggest that the dopant is diffused from the core layer into the surrounding layers.

Kanamori et al. (US 5,556,442) discloses a method for fabricating an optical waveguide including providing first, second and third vitreous layers to form a lower cladding (50), core (61), and an upper cladding (70) on a substrate (1). However, in column 2, lines 30-40, Kanamori et al. teaches that a refractive index increasing dopant present in the second vitreous layer (61) is prevented from diffusing into the first vitreous layer (50).

Mahapatra et al. (US 5,875,276) discloses waveguides formed by diffusing titanium into a single-crystal lithium niobate substrate (see the abstract and Figures). Therefore, the waveguides are created by indiffusion of a dopant into a substrate in the invention of Mahapatra. Mahapatra does not disclose or suggest diffusing a dopant from a core of a waveguide into upper and lower doped cladding layers.

Nishimoto (EP 0 617 301 A1) discloses an optical waveguide including a substrate (1), a lower doped cladding layer (7a), a core (8), and an upper doped cladding layer (7b), wherein the cladding layers are heated to a reflow temperature to eliminate or remove imperfections or gaps in the cladding layers. Nishimoto does not teach or suggest diffusing a dopant from the core into the upper and lower cladding layers.

Hirose et al. (EP 0 607 884 A1) discloses a method of forming an optical waveguide, wherein the amount of phosphorous doped into the cladding layers of the waveguide is controlled during the deposition of the cladding layers. Hirose et al. does not teach or suggest diffusing a dopant from the core into the cladding layers.

Kobayashi (JP 59137346) discloses an optical waveguide having cores (5) formed by diffusing a film of metallic Ge (2) into a lower quartz glass substrate (1) and an upper glass layer (4). Kobayashi, however, does not disclose or suggest that the upper and lower cladding layers are doped or that a lower cladding layer be provided in addition to the substrate. Additionally, the film of metallic Ge (2) is not a layer of doped material. The waveguide core is formed from a layer of doped material in the invention

of claims 1 and 30 of the present application and mobile dopant ions are diffused from the deposited doped material of the waveguide core in the present invention.

IBM Technical Disclosure Bulletin ("Buried TI In-Diffused Waveguide on Lithium Niobate") discloses a buried TI in-diffused waveguide comprising a first layer (14); a core layer (18) formed from the diffusion of a Ti stripe (12); and a second layer (16). The IBM Bulletin, however, does not teach or suggest that the first and second layers (14 and 16) are doped. Additionally, the Ti stripe is not a layer of doped material.

Hence, there is no reason or motivation for one of ordinary skill in the art to use the prior art of record to make the invention of claims 1-10, 12-14, 16-23, 25, 27, 29-40, 53, 62-71, 73, 75, 76 and 79.

Conclusion

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning the merits of this communication should be directed to Examiner Michelle R. Connelly-Cushwa at telephone number (703) 305-5327. The examiner can normally be reached 9:00 AM to 7:00 PM, Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney B. Bovernick can be reached on 703-308-4819. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Any inquiry of a general or clerical nature should be directed to the Technology Center 2800 receptionist at telephone number (703) 308-0956.

MRCC

Michelle R. Connelly-Cushwa

Patent Examiner

November 11, 2003



**AKM ENAYET ULLAH
PRIMARY EXAMINER**